Workshop on Wireless Sensing

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The first Wireless Sensing Workshop was held on June 4, 2001, at the Sensors Expo/Conference at the Rosemont Convention Center in Chicago, IL. The National Institute of Standards and Technology (NIST), SENSORS magazine, Sensors Conference, and Institute of Electrical and Electronics Engineer (IEEE) Instrumentation and Measurement Society's Technical Committee on Sensor Technology (TC-9) cosponsored the workshop. NIST is an agency of the U.S. Department of Commerce's Technology Administration. Its mission is to help increase U.S. industry competitiveness through advanced research, standards, and technology collaboration.

Recently, there has been considerable interest from industry and government in applying wireless technology to sensor-based applications.

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This is due primarily to the prolific phenomenon of Bluetooth, a wireless technology being developed by a 1200-member industrial consortium. According to earlier Bluetooth industry predictions, a billion Bluetooth wireless devices may be in use all over the world within five years. Bluetooth technology providers indicated that they could provide low cost, seamless integration of wireless devices from home automation to mobile systems, office automation, manufacturing facilities, and field operations. Other technology, such as Ethernet, has become dominant in network communication, and its usage is becoming increasingly popular in manufacturing. Wireless Ethernet has been moving from office automation into other application areas, including home and factory automation. Sensor companies have begun developing and applying these standard interfaces to sensor applications. The US Navy has also expressed interest in wireless

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sensor connectivity aboard naval vessels to enhance overall system performance, reduce manpower, and increase efficiency.

The Sensor Development and Application Group at NIST has been working with industry and IEEE to establish IEEE 1451, titled A Standard for a Smart Transducer Interface for Sensors and Actuators. In response to the industry's interest in wireless sensing, NIST initiated, cosponsored, and conducted this workshop to explore this level of interest. In addition, state-of-the-art, wireless communication technologies were examined. This workshop provided a good opportunity for representatives from industry, academia, and government to discuss the possibility of a standard for wireless sensing in an open forum. Ninety people attended the workshop to represent the manufacturing, process control, aerospace, home automation,

automotive, and government sectors. The ratio of attendees was approximately 4/2/1 for users/sensor vendors/network vendors, respectively.

The workshop opened with an overview of the IEEE 1451 standard. NIST's reference implementation of the IEEE 1451.1 smart transducer information model and the investigation of interfacing the 1451.1 model to the wireless world were discussed. Then various wireless technologies such as the wireless Ethernet standard (IEEE 802.11x) and Bluetooth were presented in detail. Following that, hardware and software tools that could help speed up wireless application development, as well as the application of wireless Bluetooth technology for sensors, were presented. One presentation proposed a wireless sensor interface standard, a potential IEEE

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P1451.5, using the IEEE 802 as a guideline for managing the IEEE 1451 framework.

After briefing the attendees on various communication interface standards, an open forum discussion began. Attendees were encouraged to provide input regarding their needs and general requirements for a wireless sensor communication interface. The results of the discussions are presented in Section III: Issues and Discussions.

The open forum appeared to be successful in determining the appropriateness of various wireless communication technologies for sensor interfacing. It has also begun the dialogue in assessing the general wireless requirements of sensor manufacturers and users. By the request of the

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attendees, a follow-up wireless sensor workshop has been scheduled for October 4, 2001, at the next Sensors Expo/Conference in Philadelphia, PA. Together we will further examine other technologies and begin pursuing the IEEE procedure for organizing a working group for developing a wireless communication interface standard for sensors.